

and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.

WHAT IS CLAIMED IS:

1. A light emitting package comprising:
a chip carrier having top and bottom principal surfaces;
at least one light emitting chip attached to the top principal surface of
5 the chip carrier; and
a lead frame attached to the top principal surface of the chip carrier.

2. The light emitting package as set forth in claim 1, further
comprising:
an encapsulant encapsulating at least the light emitting chip and the top
10 principal surface of the chip carrier, the bottom principal surface of the chip
carrier and leads of the lead frame extending outside the encapsulant.

3. The light emitting package as set forth in claim 1, further
comprising:
one or more areas of electrically conductive material disposed on the
15 top principal surface of the chip carrier, the attachment of the lead frame to the
top principal surface electrically contacting the one or more areas of electrically
conductive material.

4. The light emitting package as set forth in claim 3, wherein the
one or more areas of electrically conductive material include:
20 a first area of electrically conductive material defining a first electrical
terminal;
a second area of electrically conductive material electrically isolated
from the first area, the second area defining a second electrical terminal of
opposite electrical polarity from the first electrical terminal;
25 electrodes of the light emitting chip being electrically connected with the
first and second electrical terminals; and
the lead frame being attached to the first and second electrical
terminals.

5. The light emitting package as set forth in claim 4, wherein the light emitting chip is flip-chip bonded to the first and second electrical terminals.

6. The light emitting package as set forth in claim 4, wherein the light emitting chip is flip-chip bonded to the first and second electrical terminals
5 using one of thermosonic bonding, solder, and a conductive epoxy.

7. The light emitting package as set forth in claim 4, wherein at least one electrode of the light emitting chip is wire bonded to one of the first and second electrical terminals.

8. The light emitting package as set forth in claim 7, wherein
10 another electrode of the light emitting chip is wire bonded to the other one of the first and second electrical terminals.

9. The light emitting package as set forth in claim 3, wherein:
the one or more areas of electrically conductive material include:
a first area of electrically conductive material defining a
15 first electrical terminal,

a second area of electrically conductive material
electrically isolated from the first area, the second area defining a
second electrical terminal of opposite electrical polarity from the
first electrical terminal, and

20 a third area of electrically conductive material electrically
isolated from the first and second areas of electrically conductive
material, the third area of electrically conductive material defining
a series interconnection terminal; and

the light emitting chip includes first and second light emitting chips,
25 electrodes of the first light emitting chip being electrically connected with the
first and series interconnection electrical terminals and electrodes of the
second light emitting chip being electrically connected with the second and
series interconnection electrical terminals, and the lead frame being attached
to the first and second electrical terminals.

10. The light emitting package as set forth in claim **9**, wherein the light emitting chip further includes:

5 a third light emitting chip, electrodes of the third light emitting chip being electrically connected with the first and series interconnection electrical terminals.

11. The light emitting package as set forth in claim **10**, wherein the light emitting chip further includes:

10 a fourth light emitting chip, electrodes of the fourth light emitting chip being electrically connected with the second and series interconnection electrical terminals.

12. The light emitting package as set forth in claim **9**, further including:

15 at least one zener diode electrically connected with at least one of the first and series interconnection electrical terminals, and the second and series interconnection electrical terminals.

13. The light emitting package as set forth in claim **3**, further including:

20 at least one electronic component electrically contacting the one or more areas of electrically conductive material, the at least one electronic component regulating behavior of the at least one light emitting chip.

14. The light emitting package as set forth in claim **13**, wherein the at least one electronic component includes:

a zener diode electrically connected in parallel with the light emitting chip to provide electrostatic discharge protection.

25 **15.** The light emitting package as set forth in claim **1**, wherein the light emitting chip receives electrical power through the lead frame and does not receive electrical power through the bottom principal surface of the chip carrier.

16. The light emitting package as set forth in claim 1, wherein the bottom principal surface of the chip carrier is electrically isolated from the lead frame.

17. The light emitting package as set forth in claim 1, wherein the
5 lead frame has electrical leads extending from portions of the lead frame attached to the top principal surface of the chip carrier, the electrical leads being shaped to include lead portions approximately coplanar with the bottom principal surface of the chip carrier.

18. The light emitting as set forth in claim 17, wherein the bottom
10 principal surface of the chip carrier is at least one of substantially electrically non-conductive and electrically isolated from the lead frame.

19. The light emitting package as set forth in claim 18, wherein the chip carrier, light emitting chip, and lead frame define a surface mountable unit, the light emitting package further comprising:
15 printed circuitry, the surface mountable unit being mounted on the printed circuitry with the lead portions approximately coplanar with the bottom principal surface of the chip carrier electrically contacting the printed circuitry.

20. The light emitting package as set forth in claim 19, further comprising:
20 a printed circuit board including the printed circuitry, the bottom principal surface of the chip carrier being in thermal contact with the printed circuit board.

21. The light emitting package as set forth in claim 19, further comprising:
25 a printed circuit board on which the printed circuitry is disposed, the bottom principal surface of the chip carrier being in direct contact with the printed circuit board.

22. The light emitting package as set forth in claim 21, wherein the chip carrier is soldered to the printed circuit board.

23. The light emitting package as set forth in claim 21, wherein the chip carrier is soldered to the printed circuit board, said soldered connection
5 being thermally conductive but not conducting electrical current when the light emitting chip is operated.

24. The light emitting package as set forth in claim 21, wherein an attachment between the lead portions contacting the printed circuitry is different from an attachment of the bottom principal surface of the chip carrier
10 contacting the printed circuit board.

25. The light emitting package as set forth in claim 21, further comprising:

an encapsulant encapsulating at least the light emitting chip and the top principal surface of the chip carrier, the bottom principal surface of the chip
15 carrier and at least the lead portions approximately coplanar with the bottom principal surface of the chip carrier extending outside the encapsulant.

26. The light emitting package as set forth in claim 1, wherein the chip carrier comprises:

a semi-insulating silicon wafer.

20 27. The light emitting package as set forth in claim 1, wherein the chip carrier comprises:

electrically conductive silicon having at least the top principal surface coated with an insulating layer.

28. The light emitting package as set forth in claim 1, wherein the
25 chip carrier comprises:

metal having at least the top principal surface coated with an insulating layer.

29. The light emitting package as set forth in claim **1**, wherein the chip carrier comprises:

thermally conductive plastic.

30. The light emitting package as set forth in claim **1**, wherein the
5 chip carrier comprises:

ceramic.

31. The light emitting package as set forth in claim **1**, wherein the chip carrier is electrically insulating and the lead frame is electrically conductive.

10 **32.** A light emitter comprising:

a chip carrier having top and bottom principal surfaces;

at least one light emitting chip attached to the top principal surface of the chip carrier;

15 a lead frame electrically contacting electrodes of the at least one light emitting chip; and

a support including printed circuitry, the lead frame electrically contacting the printed circuitry, the chip carrier secured to the support without the lead frame intervening therebetween.

33. The light emitter as set forth in claim **32**, wherein the lead frame
20 comprises:

a first lead frame element extending from the top principal surface of the chip carrier to a first terminal of the printed circuitry; and

a second lead frame element extending from the top principal surface of the chip carrier to a second terminal of the printed circuitry.

25 **34.** The light emitter as set forth in claim **33**, wherein the chip carrier further comprises:

a first electrically conductive layer disposed on the top principal surface and electrically contacting the first lead frame element; and

a second electrically conductive layer disposed on the top principal surface and electrically contacting the second lead frame element.

35. The light emitter as set forth in claim 34, wherein the electrodes of the light emitting chip are electrically connected with the first and second
5 electrically conductive layers.

36. The light emitter as set forth in claim 34, wherein the first and second lead frame elements are mechanically bonded to the top principal surface of the chip carrier.

37. The light emitter as set forth in claim 34, wherein the at least one
10 light emitting chip includes at least two light emitting chips, and the chip carrier further comprises:

a third electrically conductive layer disposed on the top principal surface, electrodes of the two light emitting chips contacting the third electrically conductive layer.